January 2003

Calleguas Creek Watershed Salts TMDL Work Plan

Submitted to:
Los Angeles Regional Water Quality Control Board

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CALLEGUAS CREEK WATERSHED
SALTS TMDL WORK PLAN

Waterbody:	**Calleguas Creek reaches above Potrero Road**
Stressor:	**Salts (Chloride, TDS, Sulfate, Boron)**
Projected Completion Date:	**2005**
Consent Decree Deadline:	**Chloride-2002, other salts not scheduled**

1. Introduction (I)

Salts are a complicated issue in the Calleguas Creek watershed. It is strongly suspected that salts are being imported into the watershed at a higher rate than they are removed, and the corresponding build-up of salts threatens groundwater and agricultural supplies (see discussions in Section 5 and Section 6). However, the mechanisms through which the salts are building, the most effective ways to remove the salts, and the best ways to prevent future buildup are complex questions for which information has not been fully developed. What is known is that the solution to the salts problem will be achieved through water supply management and removing salts from the watershed to the ocean.

The goal of this work plan is to identify the tasks required to develop and implement a plan to protect agriculture and groundwater from problems associated with salts, while at the same time developing a sound scientific and legally defensible support for the chosen protection mechanism. A cornerstone of this plan will be the development of water supply management strategies that address the source of the salts issues. The outlined tasks will provide a basis for the protection of all beneficial uses impacted by salts in the watershed and an adjustment to the water quality standards as necessary to provide the most effective protection of the uses.

The salts that are addressed in this work plan include a number of different constituents. Total Dissolved Solids (TDS) is the overall measure of everything that is dissolved in the water column. The major components of TDS are bicarbonate, calcium, sulfate, hydrogen, silica, chloride, magnesium, sodium, potassium, nitrogen, and phosphate. Although TDS is the sum of a wide variety of anions and cations in the water column ranging from minerals to metals, for the purposes of TMDL development, it is considered a salt. In addition to TDS, three of the TDS components, chloride, sulfate, and boron, are included in this TMDL. The impacts of the individual constituents will be considered in addition to the cumulative impacts from the individual constituents as represented by TDS.

Other measurement techniques are sometimes used as a surrogate for measuring TDS. Conductivity measures the ability of the solution to conduct electricity due to ions in the water column. Each type of ion has a different ability to conduct electricity. As a result, conductivity is not directly equivalent to TDS because the ions that make up TDS determine the conductivity. Another related measure that will be discussed in this work plan is the Sodium Adsorption Ratio (SAR). SAR is the ratio between sodium and the sum of calcium and magnesium ions in the water using the following equation:

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$$

This ratio helps determine the impacts of irrigation water on the ability of the soils to store or leach salts. Although the work plan focuses on the 303(d) listings for TDS, chloride, sulfate, and boron (Figure 1), some of these other measures of the impacts of salts may become important to the discussion of impacts of these constituents.

Section 2 of this work plan provides background information on the salts concentrations in the watershed and the basis for the 303(d) listings as well as other questions and concerns to be addressed in this work plan. Section 3 discusses the conceptual model for salts and the work that will be done to refine this model. Section 4 reviews the data and identifies additional monitoring and source identification needs. Section 5 provides information on the water quality objectives and beneficial uses impacted by salts, and discusses the tasks required to assess the standards and uses to ensure protection of the uses in the watershed. Section 6 describes the approach to develop a water management plan to address salts and the early action items associated with this plan. Section 7 outlines the steps that will be required to develop a TMDL if deemed necessary based on the results of the work plan tasks. Section 8 discusses the support that will be provided for the development of Basin Plan Amendments. Section 9 describes the public participation plan that is being developed in association with this work plan, and Section 10 summarizes the cost estimate for the proposed tasks.

Detailed information about each of the tasks identified in each section of this work plan is included in the Task Sheet for the Salts TMDL Work Plan (Attachment 3). The Task Sheet provides the complete listing of all work proposed under this work plan and includes task descriptions, the goal of the tasks, proposed deliverables, associated costs and the schedule for completing the tasks. The text of this report is designed to provide background information for the work plan and supplement the task descriptions in the task list. Each of the tasks is identified by a code that corresponds to the section of the work plan in which it is discussed, as follows:

- Introduction-I
- Background Information-BI
- Conceptual Model-CM
- Data Analysis, Monitoring, and Source Identification-M
- Review of Water Quality Standards and Uses-WQS and UA
- Early Action Items-EA
- TMDL Development-TMDL
- Basin Plan Amendments-BPA

The status of the tasks and the additional work to be completed is summarized in each of the work plan sections.

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Figure 1– 2002 303(d) Listed Reaches

2. Background Information (BI)

Salts are imported into the watershed through three mechanisms, the State Water Project, Santa Clara River water, and deep aquifers that are pumped to the surface. The salts are then flushed out to sea through the Calleguas Creek surface water system or enter the groundwater and build up in the watershed. Salts in the water pass through wastewater treatment plants unaffected by traditional treatment processes. Concentrations increase through the use of water and evaporation when water is applied for irrigation in agriculture or at homes. Additionally, water softeners add salts to wastewater, and disinfection chemicals used in wastewater treatment facilities can add chloride and sulfate. Outside of the imported water supply, water softeners, some household products, and possibly chlorination at POTWs, salts are only concentrated through use, not added to the water.

303(d) Listings (BI-1)

Salts are listed in most of the reaches upstream of the tidal influence in Calleguas Creek (Potrero Road). Revolon Slough and Beardsley Wash are the only upstream reaches that are not listed. The following table summarizes the 303(d) listings for salts based on the 2002 proposed list.

Table 1. 2002 303(d) Listings

Reach No.	Reach Name	Boron	Chloride	Sulfates	TDS
7	Arroyo Simi	X	X	X	X
6	Arroyo Las Posas		X	X	X
8	Tributaries to Arroyo Simi	X	X	X	X
13	South Fork Conejo Creek		X	X	X
12	North Fork Conejo Creek			X	X
10	Conejo Creek Hill Canyon		X	X	X
11	Arroyo Santa Rosa			X	X
9B	Conejo Creek Main Stem		X	X	X
9A	Camrosa Diversion			X	X
3	Calleguas Creek Upper Main Stem		X		X
2	Calleguas Creek Lower Main Stem				
4	Revolon Slough				
5	Beardsley Wash				
1	Mugu Lagoon				

Blank cells indicate no listings for that constituent in the reach.

Basis of 303(d) listings (BI-2)

All of the salts listings on the 2002 303(d) list are based on the original listings that were made in 1998. In 2002, changes were made to the reaches in the Calleguas watershed, and the listings were modified to match the new reaches. However, the data supporting the 1998 listings is based on the old reaches. As a result, comparison of the 1998 listing data to the 2002 listings with the new reaches is difficult and does not necessarily clearly define the basis for the listings. The available information on the basis for the listings is

summarized in Table 2. Table 2 includes information provided in hard copy from the administrative record for the 1998 listings. A separate evaluation of the data and the calculations presented in the table has not been conducted.

Table 2. Basis of 1998 303(d) Listings

Reach No.	2002 Reach Name	1998 Reach Name	TDS			Chloride			Sulfate			Boron		
			Max	Avg.	% Exceed	Max	Avg.	% Exceed	Max	Avg.	% Exceed	Max	Avg.	% Exceed
8	Tapo Canyon	Tapo Canyon	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
7	Arroyo Simi	Arroyo Simi R2	2380	1654	86	180	130	57	1040	800	86	1.5	0.9	57
		Arroyo Simi R1	2600	1751	100	1190	277	90	1000	842	86	1.4	1.1	60
6	Arroyo Las Posas	Arroyo Las Posas R2	1280	1194	100	190	171	75	500	438	100	0.91	0.84	0
11	Arroyo Santa Rosa	Arroyo Santa Rosa	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
12	North Fork Conejo Creek	Arroyo Conejo North Fork	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
13	South Fork Conejo Creek	Conejo R4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
10	Conejo Creek Hill Canyon	Conejo R3	1240	888	52	242	172	80	571	286	63	0.5	0.46	0
9B	Conejo Creek Main Stem	Conejo R2	1210	819	35	230	173	84	386	264	56	0.5	0.38	0
9A	Camrosa Diversion	Conejo R1	1210	625	33	236	181	87	414	261	52	0.5	0.38	0
3	Calleguas Creek Upper Main Stem	Calleguas R3	1340	860	54	264	185	92	550	372	59	0.6	0.42	0
2	Calleguas Creek Lower Main Stem	Calleguas R2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Calleguas R1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Beardsley Wash	Beardsley	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	Revolon Slough	Revolon	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	Mugu Lagoon	Mugu	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N.D. indicates that no data were available for the constituent for the reach.
N/A indicates that objectives were not considered applicable to the reach so no listings were made.

As shown in Table 2, levels of TDS, chloride, boron, and sulfate exceed water quality objectives (see Table 5) in the Calleguas Creek Watershed. However, as will be discussed in Section 5, the Basin Plan salts objectives are not based on the protection of beneficial uses, but rather on the existing water quality in 1978 (anti-degradation). As a result, it is difficult to assess the impact of salts on beneficial uses based on

the objective exceedances. Sections 5 and 6 will discuss the tasks to address the impacts to beneficial uses and the actions that will be taken to protect the uses in the watershed.

Additional Data Sources (BI-3)

Since the listings were made in 1998, a number of studies have been ongoing or conducted that included monitoring for salts. All of these studies have confirmed the listings and provided more information on the way in which salts vary from season to season and year to year. This information will be used to complete the remaining tasks in the work plan. The following table summarizes the sources of information and the dates they cover.

Table 3. Sources of Data

Study Name	Types of Data Collected	Dates	Notes
Calleguas Creek Characterization Study	Monthly grab samples of discharges and receiving water for all salts	7/98-6/99	15 receiving water sites and 8 discharge sites
City of Thousand Oaks	Quarterly grabs of effluent and receiving water for all salts	1986-Present	Conejo Creek only
205(j) Non Point Source Study	Dry and wet weather non point source discharge data for all salts	11/98-5/99	4 samples at 11 different land use sites
Ventura County Flood Control District Stormwater Program	Surface water and discharge salts data	1992-Present	Limited salts data
Groundwater Monitoring	Varies	Unknown	Variety of well data from municipal and agricultural wells
NPDES Monitoring	Monthly grabs of effluent and receiving water	1980-Present	

Status of Background Information Tasks: The majority of the Background Information tasks listed in the attached table have been completed.

Additional Work to be Completed: Collect additional data from LARWQCB to complete basis for listings and compile a database of all available data for further analysis.

3. Conceptual Model (CM)

A conceptual model is designed to show how the pollutants and water flow through the system and the impacts on beneficial uses. A draft, basic conceptual model has been developed to show how salts and water flow through the Calleguas watershed. However, it does not include the magnitude of the sources and flows or how salts impact beneficial uses. The purpose of the basic conceptual model is to demonstrate some basic facts about salts in the watershed.

The basic conceptual model, presented in Figure 2, demonstrates that the management of salts is dependent on water management. There are very few places where salts are actually added to the

system. Instead, the way that water flows through the system impacts the amount of salts in any given location. The arrows in blue represent the flow of water through the system and the black arrows represent the addition of salts. Outside of these black arrows, the salts in the water just flow through the system and are concentrated through each use as a result of evaporation.

Salts are primarily added to the watershed through the imported water supply (including deep aquifer groundwater sources of supply). Human use of water concentrates and adds salts to the water. Some activities, such as water softeners, contribute significant amounts of chloride to the waste discharged to a wastewater treatment facility. Septic tanks are a potential source of salts to the groundwater. Irrigation concentrates salts through evaporation and evapotranspiration by plants, but agricultural activities do not add salts to the water discharged. Additional salts may be contributed to groundwater concentrations as water traveling through the soils leaches salts from the sediments.

Status of Conceptual Model Tasks: A very basic conceptual model diagram of the movement of salts through the watershed has been developed.

Additional Work to be Completed: The draft conceptual model needs to be upgraded to include the magnitude of sources and flows, and the mechanisms in which salts impact beneficial uses (CM-1). Quantities of septic tanks and water softeners and the magnitude of their contribution to the chloride load will be investigated and quantified. A Conceptual Model and Source Assessment Report will be completed as part of Tasks CM-2, CM-3, and CM-4. These tasks will include peer review and revision of the draft conceptual model and the Conceptual Model and Source Assessment Report.

4. Data Analysis, Monitoring, and Source Identification (M)

The tasks in this section involve reviewing the existing data and determining if there are any areas where more information is necessary. Based on an initial review, it does not appear that there are any significant gaps in the existing water quality information. Data are available for many years at several sampling locations, and some limited source identification data are available for salts. However, a more comprehensive review will be conducted as one of the work plan tasks, and additional monitoring will be performed if necessary. Data quality objectives will be developed as part of this task to assess existing data quality and quantity.

Additional monitoring or data gathering for identification and quantification of sources may be necessary. A review of work being conducted by other agencies in Southern California to assess the extent of water softener contributions of chloride to wastewater will be conducted. If applicable, this information will be used to quantify water softener loadings.

Status of Monitoring Tasks: A cursory review of existing water quality data has been completed.

Additional Work to be Completed: Task M-2 needs to be completed in more detail using criteria developed in Task M-1. Tasks M-3, M-4, and M-5 will be completed if necessary based on the results of Tasks M-1 and M-2.

Insert

Figure 2. Draft Conceptual Model for Salts

5. Review of Water Quality Standards and Uses (UA and WQS)

Beneficial Uses Impacted by Salts (UA-1)

Salts primarily impact two beneficial uses: agriculture irrigation and groundwater recharge. In addition, chloride has the potential to impact aquatic life, there are secondary drinking water standards for some salts, and industrial processing can be impacted by high salts concentrations. The following table summarizes the locations of these beneficial uses as listed in the Basin Plan.

Table 4. Beneficial Uses Potentially Impacted by Salts in Calleguas Watershed

Reach	Hydro Unit	AGR	GWR	PROC	MUN	WARM
Mugu Lagoon	403.11					
Calleguas Creek Estuary	403.11					
Calleguas Creek	403.11	E	E		P*	E
Calleguas Creek	403.12	E	E	E	P*	E
Revolon Slough	403.11	E	E		P*	E
Beardsley Wash	403.61				P*	E
Conejo Creek	403.12	E	E	E	P*	E
Conejo Creek	403.63		I		P*	I
Arroyo Conejo	403.64		I		P*	I
Arroyo Conejo	403.68		I		P*	I
Arroyo Santa Rosa	403.63		I		P*	I
Arroyo Santa Rosa	403.65		I		P*	I
North Fork Arroyo Conejo	403.64	E	E		P*	E
Arroyo Las Posas	403.12	P	E	P	P*	E
Arroyo Las Posas	403.62	P	E	P	P*	E
Arroyo Simi	403.62		I		P*	I
Arroyo Simi	403.67		I		I*	I
Tapo Canyon Creek	403.66	P	I	P	I*	I
Tapo Canyon Creek	403.67	P	I	P	I*	I
Gillibrand Canyon Creek	403.66		I		P*	I
Gillibrand Canyon Creek	403.67		I		P*	I

P = potential beneficial use

E = existing beneficial use

* Asterisked MUN designations are not to be put into effect until a study has been done to confirm the presence of the beneficial use.

A current assessment of the impacts of salts on these beneficial uses has not been completed. Tasks UA-2, UA-3, UA-4, and UA-5 are designed to gather information on existing impacts and potential impairments of these beneficial uses in the Watershed. For all of these tasks, an investigation into the existing uses in the Watershed will be conducted. The investigation will address the following questions:

- What concentration of salts is necessary to protect the beneficial use?
- Which uses exist and where are they located?
- How is water used?
- How does the mechanism of recharge/use impact beneficial uses?
- How do impacts occur? Are they immediate or more long term?

Existing Objectives and Basis for Objectives (WQS-1)

Surface Water Objectives

The existing 303(d) listings are based on exceedances of water quality objectives in the Basin Plan. These objectives are not based specifically on the protection of any of the beneficial uses listed above. The objectives are based on the anti-degradation policy and were set in 1975 and updated in 1978 based on the existing water quality in the watershed at the time. The basis for the objectives and how they have changed over time are discussed in this section. The Basin Plan objectives are presented as waterbody-specific objectives in Table 3-8 of the Basin Plan.

Table 5. Basin Plan Objectives for Salts

Constituent	Objective Upstream of Potrero Road (mg/L)
TDS	850
Chloride	150
Sulfate	250
Boron	1.0
SAR	Not enough data

In addition to the existing objectives, the Basin Plan provides suggested ranges for protection of the other beneficial uses in the Basin Plan. The following table summarizes the proposed ranges for protection of beneficial uses. None of these are adopted objectives/standards.

Table 6. Ranges of Concentrations (mg/L) for Different Beneficial Uses

	MUN	PROC	AGR	AQ Life
TDS	500 (USEPA secondary MCL)	50-1500	450-2000	
Chloride	250 (USEPA secondary MCL)	20-1000	100-355	230
Sulfate	400-500 (USEPA proposed MCL)	20-300	350-600	
Boron			0.5-4	

The anti-degradation objectives are the only enforceable objectives in the watershed. The objectives in Table 5 are waterbody-specific and only apply upstream of Potrero Road. It is unclear based on the reach definitions in Table 3-8 of the Basin Plan whether or not the waterbody-specific values apply to Revolon Slough and Beardsley Wash. Because Revolon Slough enters Calleguas Creek downstream of Potrero Road, it does not appear that the objectives apply to these reaches.

Basis of Surface Water Objectives

In March of 1975, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted the Basin Plan for the Santa Clara River Basin (4A), which includes the Calleguas Creek Watershed. The 1975 Basin Plan included the salts surface water quality objectives for the Calleguas Creek Watershed in Table 4-1, pages I-4-10 and I-4-11 of the 1975 Basin Plan (See Attachment 1). The objectives were set for Calleguas Creek at Potrero Road based on a weighted annual average per footnote (a).[1]

In March of 1978, the Regional Board amended the 1975 Basin Plan to revise certain salts objectives for the Calleguas Creek watershed. Attachment 1 includes the revision pages taken from the Regional Board's Administrative Record that discuss the 1978 revisions to the Basin Plan. As seen in Attachment 1, the objectives were revised because "the current Basin Plan objectives for surface water and groundwater in this portion of the basin are inconsistent in view of the continuity of these waters. The proposed changes correct this inconsistency. In addition, the proposed numbers reflect current water quality. Within this reach there are two controllable point source discharges: Thousand Oaks Hill Canyon and Camarillo STP. Both discharge into Conejo Creek tributary to Calleguas Creek and comply with waste discharge requirements prescribed by this Board. The proposed changes will not have any significant effect upon the existing or potential beneficial uses." The numeric objectives for chloride and sulfate were changed and the reach designations changed from at Potrero Road to above Potrero Road. However, the footnote describing that the objectives are to be applied as weighted averages remained unchanged.

Table 7 summarizes the 1975 and 1978 Basin Plan objectives along with the data on which the 1978 objectives are based. The 1978 water quality objectives were based on existing data from 1975-1977. No data were presented from previous years. It is unclear, based on the data summary, exactly how the objectives were chosen. However, weighted annual averages are not presented in the data summary, only arithmetic means are included. The data used to determine the objectives were collected at the Camarillo State Hospital (see Attachment 1).

Table 7. Summary of Changes to 1975/1978 Basin Plans

Constituent	1975 Objective, mg/L (at Potrero Road)	1978 Objective, mg/L (above Potrero Road)	Max 1975-1977 Data (mg/L)	Mean of 1975-1977 Data (mg/L)
TDS	850	850	N/A	N/A
Chloride	50	150	169	124 (27 samples)
Sulfate	400	250	300	193 (27 samples)
Boron	1.0	1.0	N/A	N/A

N/A - Data were not presented because these objectives were not revised in 1978.

The discussion about the changes made in 1978 indicate that the objectives in the Basin Plan were only intended to apply to the lower Calleguas and Conejo Creek reaches of the Watershed, not the Arroyo Simi and Arroyo Las Posas. The reasons for changing the objectives are stated as being that the objectives are inconsistent based on the continuity of the waters, and they only reference the Hill Canyon and Camarillo POTWs as discharging to the reach to which the objectives apply. The Simi Valley and Moorpark WWTPs

[1] Footnote (a) states: "The objective *at each station* is of the *weighted annual average*. Samples shall be collected at monthly intervals preferably but at least at quarterly intervals. *Flow rate* shall be determined at the time of sampling [emphasis added]."

were discharging in 1978 and are not described as discharging to the reach. Additionally, the monitoring station on which the objectives are based is located at the Camarillo State Hospital gauging station. Surface flow from the Arroyo Simi and Arroyo Las Posas does not reach this station except possibly during wet weather events (i.e. not contiguous). As a result, the objectives set based on the water quality in 1975 and 1978 do not appear to be intended to apply to the Arroyo Simi/Las Posas reaches of the watershed.

In 1994, the Regional Board again amended the Basin Plan and omitted footnote (a), which described the basis of the salts objectives and how compliance with these objectives would be determined. The Basin Plan as adopted in 1975 and amended in 1978 included weighted annual average objectives as determined at Potrero Road. Now, with the application of the objective to waters upstream of Potrero Road and the omission of footnote (a), the objective is interpreted as an instantaneous maximum that has to be met at any given location within the applicable reach.

Because the objectives for salts in the watershed are based on the existing water quality in the 1970s and not on the protection of a beneficial use, the appropriateness of the data used to develop the objectives, the way in which the water quality has changed over time, and the effectiveness of the objectives for protecting beneficial uses needs to be examined. This work will be completed under Tasks WQS-3, UA-2, UA-3, and UA-4. Task WQS0-3 will examine the data used to develop the objective, the conditions occurring in the watershed at the time the objective was set (rainy season, drought, etc.) and the trends in the salt concentrations over time to determine if salt concentrations in surface water are actually changing or if they are just representative of natural conditions in the watershed. The UA tasks will examine the beneficial uses and the objectives required to protect those uses.

To address the change in averaging periods from flow weighted annual averages to instantaneous maximums, Tasks WQS-6 and WQS-7 are designed to look at the impact on objective exceedances of the averaging period that is used to determine the exceedance. Alternative objectives will be developed that address both the historic objectives in the Basin Plan and the appropriate averaging periods necessary to protect the beneficial uses in the watershed as identified in the UA tasks.

As the numeric surface water objectives are based on existing water quality in the 1970's, the anti-degradation policy is especially relevant to the examination of these objectives. Following is the anti-degradation policy (Statement of Policy with Respect to Maintaining High Quality of Waters in California, State Board Resolution No. 68-16):

> "WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and
>
> WHEREAS water quality control policies have been and are being adopted for waters of the State; and
>
> WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

Groundwater Objectives

Because groundwater recharge is one of the beneficial uses impacted by salts, the groundwater objectives in the watershed must be taken into account. The following table summarizes the groundwater objectives for the various groundwater basins in the watershed.

Table 8. Groundwater Objectives in Calleguas Creek Watershed (mg/L)

	GWR Arroyo Simi/Simi Valley Basin	GWR Arroyo Simi/ South Las Posas	GWR Arroyo Las Posas/ South Las Posas	GWR Arroyo Las Posas/ North Las Posas	GWR Arroyo Santa Rosa and Conejo/ Arroyo Santa Rosa Basin	GWR Arroyo Santa Rosa/ Tierra Rejada Basin	GWR Arroyo Conejo/ Thousand Oaks area	GWR Arroyo Conejo/ Conejo Valley	GWR Conejo and Calleguas/ Pleasant Valley
TDS	1200	2500	1500	500	900	700	1400	800	700
Chloride	150	400	250	150	150	100	150	150	150
Sulfate	600	1200	700	250	300	250	700	250	300
Boron	1.0	3.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0

As shown in Table 8, most of the groundwater objectives are equal to or higher than the surface water objectives. The basis for the groundwater objectives needs to be determined as well as the connection between surface water concentrations and groundwater concentrations.

Additional review will be conducted under this work plan to determine if any other relevant standards or objectives need to be considered to address salts (WQS-2).

Natural Conditions (WQS-4)

Another key issue related to salts is the definition of natural and background conditions. Concentrations of salts in groundwater discharges are higher than the surface water objectives in areas upstream of wastewater treatment plant discharges. Although these areas may be impacted by urban activities, such as irrigation and septic tanks, the condition of rising groundwater is a naturally occurring condition. The soils in this watershed are marine sediments and may be high in salts. As a result, groundwater concentrations of salts may result from salts leaching from the soils, or there may be human impacts that cause salt concentrations to rise. A definition of natural conditions for salts needs to be developed for this watershed to determine whether or not the natural salt levels exceed objectives in some areas of the watershed. Task WQS-4 is designed to address this issue.

Droughts (WQS-5)

Droughts play a major role in impacting the concentrations of salts in a watershed. Droughts will be examined through Task WQS-5 to determine how salts concentrations change in relation to droughts, the typical length of the impact, how droughts impact beneficial uses, and how droughts can be addressed through the water supply management plan, water quality objectives and/or the TMDL process. Other seasonal analyses will also be conducted under this task to determine if there are any impacts from seasons that need to be considered as part of the objective determination.

Status of Water Quality Standards and Use Analysis Tasks: WQS-1 and UA-1 have been basically completed in this work plan. WQS-2 has been addressed, but not completed in the work plan.

Additional Work Needed: The remaining UA and WQS tasks will be completed as part of the work done under this work plan. If a UAA is necessary, the following reports, among others, will be used as guidance: *A Suggested Framework for Conducting UAAs and Interpreting Results* and *A Comprehensive UAA Technical Reference*. The work conducted to develop a UAA would be coordinated closely with the RWQCB to ensure that all requirements are met. Regardless of whether a UAA is necessary, a Use Attainment and Water Quality Standards Report will be developed (WQS-9, WQS-10, and WQS-11).

6. Early Action Items (EA)

The other tasks in this work plan are designed to determine the extent and magnitude of salts impacts in the watershed and identify the objectives necessary to protect beneficial uses. This section describes the upfront actions and water supply management plan that will be developed to address the salts issues while the other tasks are being completed.

Water Softeners (EA-1,EA-2)

One of the only identified significant sources of salts into the watershed, outside of the water supply, is water softeners. As an early action item, the contribution of water softeners to wastewater treatment plant

influent will be identified. Recent work that has been done by the County Sanitation Districts of Los Angeles County will be reviewed for applicability to the Calleguas Creek Watershed and combined with work done by local agencies to provide estimates of loadings from water softeners. If necessary, additional monitoring will be conducted to identify site-specific loadings for areas in the watershed.

If water softeners are determined to be a significant source of salts in the Calleguas Creek Watershed, options for controlling the discharge from the softeners will be investigated. Local agencies have little control over the use of water softeners in their sanitary districts due to state regulations, but the laws will be reviewed, and other measures, such as public outreach, will be investigated to identify feasible control measures for reducing salt additions from water softeners. Although local agencies will employ options available to them to reduce water softener contributions, the limitations on local authority mean that legislative assistance would be necessary to fully address contributions from water softeners.

Water Supply Management Plan (EA-3, EA-4, EA-5, EA-6)

A key part of any work done on salts is the development of a water supply management plan to address agriculture and groundwater recharge in the Calleguas Creek Watershed. This includes the protection of groundwater basins, currently used agricultural water supplies and the provision of additional, higher quality supplies for sensitive crops as necessary. Although the final water management plan will be developed as part of this work plan, this section describes the early actions that are currently underway as part of the plan and the milestones for developing the remainder of the management plan.

The goals of the water supply management plan are two-fold: to protect all beneficial uses impacted by salts and to develop a mechanism for preventing salt build-up in the watershed over the long term. Recent investigations into the salt problem have indicated that one of the major issues for the groundwater basins in the vicinity of the surface water is that they are full. The constant recharge from wastewater discharges maintains the basins at high levels, even though water is constantly pumped from the basins for agricultural use. The water quality of these basins is generally rather poor, although the reasons for the poor quality water have not been identified. In order to improve the quality of the basins, the poor quality water must be removed and replaced with higher quality water. However, if the basins are constantly replenished by stream flows, it would be nearly impossible to pump out the poorer quality water. As a result, in some areas of the watershed, the reduction of wastewater flows to the stream may be necessary to protect groundwater supplies (See Attachment 2).

Because the water supply management plan could result in system modifications that would create significant changes to the flow regime in the watershed, it will be necessary to identify these changes and model them to determine whether the changes will result in compliance with objectives, and provide information on the conditions that will be present in the watershed should a TMDL need to be developed for salts, and potentially other TMDLs, in the watershed. Significant changes to the system will create different dynamics that will need to be taken into account when the TMDLs are developed. As a result, the identification, evaluation, and modeling of the system modifications are essential early action items to allow the development of TMDLs to proceed as necessary with information about the likely future flow conditions in the watershed.

System modifications are only one element of the water supply management plan. Following are the currently identified key elements of the plan:

- Identify and provide the appropriate quality of water for the uses
    - Identify water quality needed for different uses
    - Ensure that infrastructure is available to provide the appropriate water quality to the user
    - Identify cost effective mechanisms for supplying appropriate quality water
        - Blending
        - Point of use treatment
        - Regional treatment
- Determine an appropriate pricing structure to protect uses and correspond to the water quality necessary to protect the uses
- Provide mechanisms to ensure protection of the agricultural beneficial use into the future
- Manage the groundwater basins to prevent salt and other pollutant buildup
    - Pump and remove or treat poor quality groundwater
    - Lower groundwater levels in full basins to reduce leaching and allow recharge of higher quality water
    - Recharge groundwater basins with higher quality water
    - Manage irrigation to reduce leaching of salts into groundwater/ recharge of basins with poorer quality water
- Ensure long term management of salts in watershed
    - Brine line/mechanism for removing salts to the ocean
    - Necessary treatment facilities (point of use, regional as necessary)
    - Infrastructure for water supply
    - Identify triggers for conducting additional investigations or providing more treatment

Various agencies in the watershed have already begun to investigate and implement components of the water supply management plan. Following is a short description of the projects underway in the watershed. A discussion of the proposed implementation plan for Conejo Creek to address salts and water supply management is included as Attachment 2.

- Calleguas Municipal Water District is working with other public water and wastewater agencies to construct the Calleguas Regional Salinity Management Project, which is designed to help manage high salinity water use and disposal. The project consists of a pipeline system that would collect treated wastewater and brine concentrates from wastewater treatment plants, groundwater wells (both municipal and agricultural), and industrial operations located within the Calleguas Creek watershed, and convey the effluent to other areas for direct use or an existing ocean outfall. Ocean disposal would allow substantial reductions in the amounts of dissolved salts and other water pollutants that are currently released into Calleguas Creek and its tributaries. This is expected to result in substantial improvements in water quality of affected creeks and groundwater supplies.

  The project will enable both public and private water agencies to utilize high salinity groundwater that at the present time cannot be widely used due to poor quality. However, with advancements in treatment technologies and reduced costs, opportunities to recover brackish groundwater are becoming cost-effective. Groundwater recovery projects would entail the extraction and treatment

of brackish groundwater with reverse osmosis or other type of membrane treatment to remove salt and mineral concentrations. Many groundwater basins throughout Ventura County have concentrations of total dissolved solids, sulfates, chlorides and other constituents that either exceed drinking water standards or render the groundwater unsuitable for other uses such as irrigation of certain agricultural crops (e.g., strawberries and avocados). The project would facilitate disposal of brines associated with new treatment facilities, allowing use of the treated water for various beneficial uses and thereby increasing regional water supply reliability.

The project is divided into two distinct phases. Phase I is comprised of the pipeline from the Camrosa Water District Wastewater Treatment Plant to an existing ocean outfall in the City of Oxnard. The remaining portions of the pipeline system extend north and east from the Camrosa plant to the City of Simi Valley (See Figure 3). Phase II segments would provide for connections to other municipal wastewater and groundwater treatment facilities in the watershed.

Project planning is underway and, construction of the $64 million project is expected to occur over a seven year period beginning in 2003. A program environmental impact report was certified by Calleguas MWD in September 2002. Design specifications for the first segment of Phase I have been approved, and construction is scheduled to begin in February 2003. Phase II components will be designed and constructed incrementally in coordination with POTWs and other potential dischargers.

- The Calleguas Municipal Water District is working with Zone Mutual to provide imported State Project Water to agricultural users so that they can blend the lower salt concentration water with poorer quality groundwater from the shallow South Las Posas Basin aquifer to obtain water of sufficient quality for agricultural use. In return, Zone Mutual will pump higher volumes of water from the South Las Posas to remove the poorer quality water and allow recharge by higher quality surface water into the basin. The resulting project will reduce demands on the lower Las Posas Basin, which has higher quality water, and improve the quality of the water in the shallow portions of the South Las Posas Basin.

- The Camrosa Water District and the City of Thousand Oaks are investigating the possibility of removing the Hill Canyon effluent from the Conejo Creek system and reusing the effluent for agricultural irrigation. To maintain flows in the Conejo Creek to support aquatic life and to provide dilution for non-point source flows, imported water will be discharged to the stream at a necessary volume to meet water quality objectives, provide higher quality water for recharge to the groundwater basins, and maintain flows for aquatic life. The Camrosa Water District and the Camarillo Sanitary District are also evaluating the removal of the Camarillo effluent for reuse as part of this project (See Attachment 2).

Status of Early Action Tasks: Some initial work on the water supply management plan (EA-6) and system modifications (EA-3) has been completed by the local agencies.

Additional Work Needed: Additional work on EA-6 and EA-3 needs to be conducted to complete these tasks, and the remainder of the tasks needs to be completed. Task EA-7 will be initiated in conjunction with the implementation of other EA tasks.

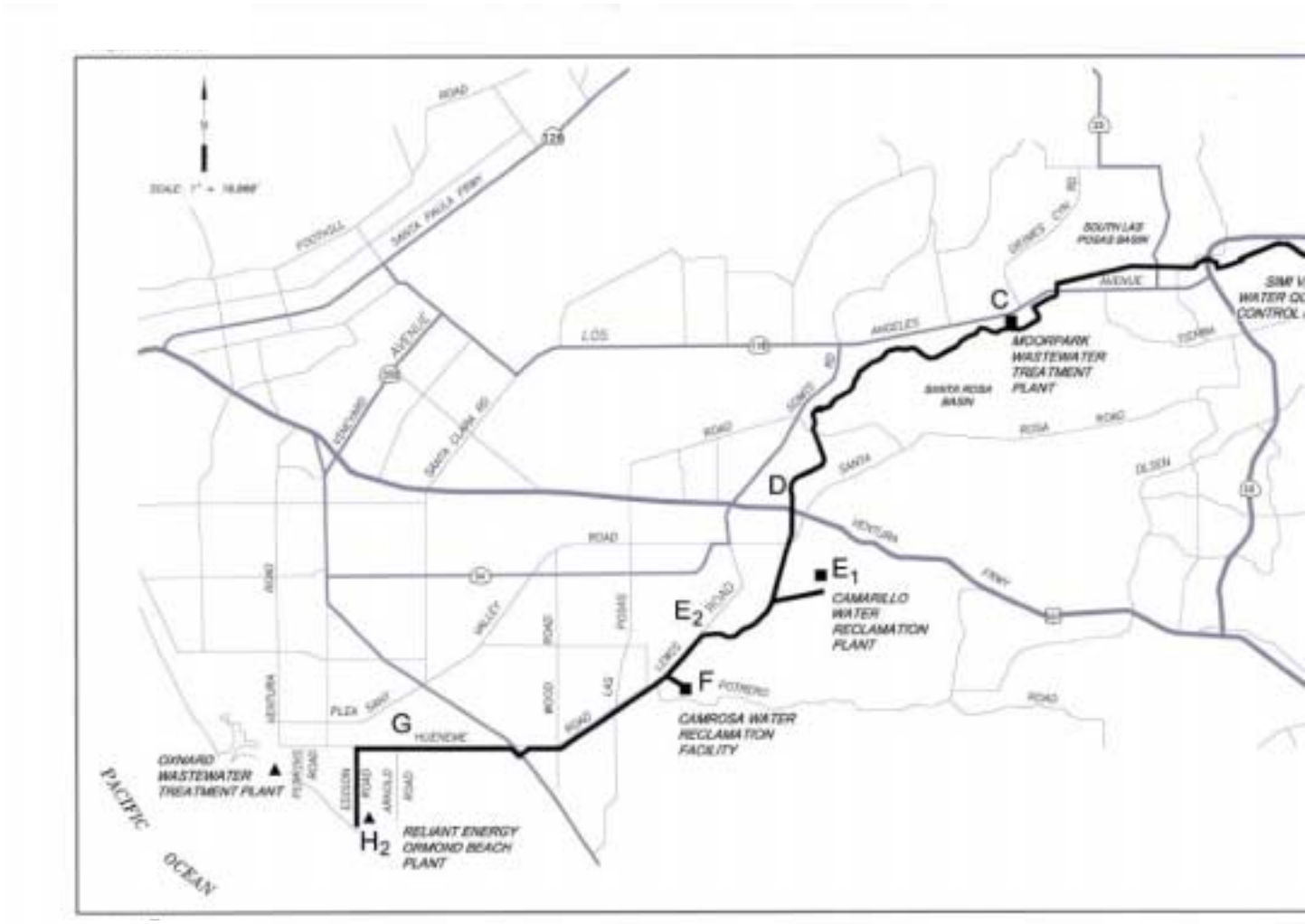

Figure 3. Salinity Management Project Pipeline Alignment

7. TMDL Development (TMDL)

A TMDL for chloride has already been adopted by the United States Environmental Protection Agency (USEPA). For the other listed constituents, TMDLs will need to be developed if necessary to protect the beneficial uses in the Watershed. All of the work conducted under the tasks listed above will be used to develop a TMDL for salts if necessary. However, many of the early action items may result in compliance with objectives, and the development of a water management plan may provide an alternative mechanism for protecting the beneficial uses, developing site-specific objectives, and adjusting uses that will alleviate the need to develop a TMDL. If the tasks do not resolve the salts problem, a TMDL will be developed.

Additionally, the steps that are being taken to address the salts problems in the watershed have the potential to impact the development of a TMDL. As a result, any TMDL developed will take into consideration system modifications that may be implemented in the watershed that modify the flows and concentrations in the stream systems. For this reason, the system modifications will be identified early in the process to allow time for development of a TMDL if necessary with knowledge of the modifications.

To develop a TMDL, the adopted USEPA TMDL regulations in effect will be used and all California State requirements will be met as part of the development. Current efforts to update and adopt new TMDL and watershed regulations will be closely followed to ensure the appropriate regulations are addressed. The targets used in the TMDL will be the standards in the Basin Plan or site-specific objectives adopted based on the work conducted in this work plan as determined by the results of the studies and the timing of the work completed.

Status of TMDL Tasks: No work has been conducted to develop the TMDL, though some of the information developed as part of the introduction and background information sections of this work plan can be used for completing the TMDL Tasks.

Additional Work Needed: If necessary, the tasks outlined in the Task Sheet for developing TMDLs will be conducted using the information developed through the other tasks completed under this work plan.

8. Basin Plan Amendments (BPA)

A variety of basin plan amendments may be developed as part of this work plan. Amendments will be required for any site-specific objectives developed, and a TMDL will require a basin plan amendment as well. The tasks and budget presented in the Task Sheet are designed to support the Regional Board in their Basin Planning efforts by providing technical and financial support as necessary to facilitate the development and approval of the amendments.

Status of Basin Plan Amendment Tasks: No work has been done to develop basin plan amendments.

Additional Work Needed: All tasks will be completed as part of this work plan.

9. Stakeholder and Public Participation

Efforts will be made to reach out to other interested parties to solicit input regarding all aspects of the proposed work plan. This may include use of technical workshops to review methods, results and conclusions for the proposed studies. The budget for this work plan does not include an allocation for performance of outreach activities.

A technical review panel consisting of experts in the field of agriculture, aquatic life impacts from salts, and groundwater recharge will be assembled to assist in the review of the work plan and subsequent deliverables. A process for review of the technical report by relevant state and federal agencies will be established. The document "Calleguas Creek Watershed Administrative and Public Process for TMDL Work Plans" presents an in-depth discussion on the stakeholder and public participation process.

10. Schedule and Cost Estimate

Attachment 4 presents a schedule for the tasks outlined in the Task Sheet for the Salts TMDL Work Plan (Attachment 3). The schedule assumes an efficient review process for all major work products entailing a two-month review preceding a one-month revision period.

Table 9 presents a cost estimate for each task, including labor costs, the costs for special experts, and other direct costs. As there is the potential that some of the tasks outlined in this work plan may not need to be completed; those tasks are identified as possible costs in the table. The estimated cost for completing the work plan tasks is $968,430. Attachment 5 provides a more detailed cost estimate.

Table 9. Cost Summary for Salts TMDL Work Plan

Major Deliverable	Tasks Included	Total Probable Cost	Total Possible Cost
Development of Conceptual Model and Source Assessment Report	I-2, BI-1, BI-2, BI-3, CM-1, CM-2, CM-3, CM-4, M-1, M-2, WQS-5, UA-2, UA-3, UA-5, UA-6, EA-1	$ 191,235	
Development of Use Attainment and Water Quality Standards Report	UA-1, WQS-1, WQS-2, WQS-3, WQS-4, UA-4, UA-7, WQS-6, WQS-7, WQS-8, UA-9, UA-10, UA-11, WQS-9	$ 122,585	$ 8,560
Development of UAA	UA-12, UA-13, UA-14		$ 72,950
Development and Implementation of Monitoring Plans	M-3, M-4, M-5		$ 79,240
Development and Implementation of Early Action Items	EA-2 through EA-10	$ 132,380	
Development of TMDL and Basin Plan Amendments	TMDL-1 through TMDL-12 and BPA-1 through BPA-9		$ 188,380
Meetings	PM	$ 111,540	$ 54,080
Project Management and Contract Administration	CA	$ 61,560	
	Total	**$ 619,300**	**$ 403,210**

References

Los Angeles Regional Water Quality Control Board (LARWQCB). 1994. Water Quality Control Plan – Los Angeles Region.

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Los Angeles Regional Water Quality Control Board (LARWQCB). 1996. 1996 Water Quality Assessment Data Summaries.

Water Environment Research Foundation (WERF). 1997a. A Suggested Framework for Conducting UAAs and Interpreting Results. PROJECT 91-NPS-1

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RETURN TO PLANNING

Attachment 1

Water Quality Control Plan Report

SANTA CLARA RIVER BASIN (4A)

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION (4)

Part I, PART II, VOL. I

March 1975

1975 Basin Plan Objectives

TABLE 4-1

MINERAL QUALITY OBJECTIVES FOR SURFACE WATERS

Stream/Station[b]	TDS	Sulfate	Chloride	Boron	Nitrogen[c]	SER[d]
	Objectives (mg/l)[a]					
Ventura River:						
At Matilija Hot Spring	600	300	50	1.0	5	e/
At Casitas Vista Road	800	300	60	1.5	5	e/
At Shell Road	1,500	600	600	1.5	10	5.0
Santa Clara River:						
At West Pier Highway 99	900	450	80	1.5	10	5.0
At Los Angeles and Ventura County Line	1,100	550	90	1.5	5	10.0
At A Street, Fillmore	1,300	650	80	1.5	5	5.0
Santa Paula Bridge	1,300	650	80	1.5	5	5.0
At Saticoy Diversion Dam	1,100	550	60	1.5	5	5.0
At United States Highway 101	800	400	60	1.5	5	5.0
Santa Paula Creek:						
At Santa Paula Water Works-Diversion Dam	600	300	60	1.0	5	5.0
Sespe Creek:						
(500 feet downstream from Little Sespe Creek, at gaging station)	800	400	60	1.5	5	5.0
Piru Creek:						
(at gaging station below Santa Felicia Dam)	950	500	50	1.5	5	5.0
Calleguas Creek:						
At Potrero Road	850	400	50	1.0	5	e/

I-4-10

MINERAL QUALITY OBJECTIVES FOR SURFACE WATERS

Stream/Station[b]	TDS	Sulfate	Chloride	Boron	Nitrogen[c]	SER[d] / (SAR)
	Objectives (mg/l)[a]					
Ventura River:						
At Matilija Hot Spring	600	300	50	1.0	5	e/
At Casitas Vista Road	800	300	60	1.5	5	e/
At Shell Road	1,500	600	600	1.5	10	5.0
Santa Clara River:						
At West Pier Highway 99	900	450	80	1.5	10	5.0
At Los Angeles and Ventura County Line	1,100	550	90	1.5	5	10.0
At A Street, Fillmore	1,300	650	80	1.5	5	5.0
Santa Paula Bridge	1,300	650	80	1.5	5	5.0
At Saticoy Diversion Dam	1,100	550	60	1.5	5	5.0
At United States Highway 101	800	400	60	1.5	5	5.0
Santa Paula Creek:						
(Above) At Santa Paula Water Works-Diversion Dam	600	300	60	1.0	5	5.0
Sespe Creek:						
(Above gaging station) ~~(500 feet downstream from Little Sespe Creek, at gaging station)~~	800	400	60	1.5	5	5.0
Piru Creek:						
(Above) ~~(at~~ gaging station below Santa Felicia Dam)	950	500	50 (75)	1.5	5	5.0
Calleguas Creek:						
(Above) ~~At~~ Potrero Road	850	400 (250)	50 (150)	1.0	5 (10)	e/

Proposed revision on next Page

00034

Page: 34 | Piru Creek above gaging station below Santa Felicia Dam

Recommended Change:

Change Cl objective from 50 to 15 mg/l.

Justification: There are no point source discharges to Piru Creek. Chloride levels represent natural flow conditions which are not controllable by the Board. Most of the flow in the creek is State Project water released from Lake Piru. The quality of State Project water is not expected to improve and has typically reached levels of 61 mg/l chloride. No significant impact on beneficial uses is expected from this change in the chloride objective.

see also Table 3 attached

Page: 34 | Calleguas Creek above Potrero Road

Recommended Change:

Change SO4 objective from 400 to 250 mg/l

Change Cl objectnie from 50 to 150 mg/l

Change N objective from 5 to 10 mg/l

Justification: The current Basin Plan objectives for surface water and groundwater in this portion of the basin are inconsistent in view of the continuity of these waters. The proposed changes correct this inconsistency. In addition the proposed numbers reflect current water quality. Within this reach there are two controllable point source discharges: Thousand Oaks Hill Canyon and Camarillo STP. Both discharge into Conejo Creek tributary to Calleguas Creek and comply with waste discharge requirements prescribed by this Board. The proposed changes will not have any significant effect upon the existing or potential beneficial uses.

see also Table 4 attached

TABLE 4

Calleguas Creek

Station	Parameter	1970 – 1974		1975 – 1977	
		Range High	Arithmetic Ave	Range High	Arithmetic Av
Camarillo State Hospital, gaging sta.	SO_4	–	–	300	193 (27)
	Cl	–	–	169	124 (27)
	N	–	–	14.9	4.84 (27)

Note:
The number in parentheses indicates number of samples

Attachment 2:
Implementation Plan for Salt Management on the Conejo Creek and Lower Calleguas Creek Sub-Watersheds of the Calleguas Creek Watershed

Agencies with water resource and wastewater treatment responsibilities on the Calleguas Creek Watershed (CCW) have developed a general concept for implementation of a salt management plan that is intended to address both surface water and groundwater salt loading problems on the watershed. These plans are the result of years of effort by these agencies and other participants in a watershed management planning process on the watershed. These efforts have resulted in identification of a defined problem, general principles to guide problem resolution, key tools needed to achieve a solution and guidelines for use of those tools. This is the basis and general overview of the concept developed for the Conejo-Lower Calleguas Creek sub-watershed.

The Problem

The thriving community on the CCW depends on the importation of water from deep groundwater aquifers filled thousands of years ago, from the Santa Clara River Watershed water imported for agricultural irrigation and from the California State Water Project Water imported primarily to support urban developments. The CCW is unable to assimilate the large volumes of wastewaters produced by the use of these imported waters on the watershed. The natural hydrologic conditions of the CCW have been so dramatically altered by the importation of water that watershed no longer experiences the effects of seasonal dry periods nor the impacts of cyclical drought. Ample water is available year round throughout the most severe drought conditions, on demand; applied as it arrives on the watershed to support both indoor urban needs, landscape irrigation and large-scale year-round agricultural irrigation. The resulting wastewaters from the various uses of imported water are released on a continuous basis to the watershed, whether through municipal wastewater treatment works, urban run-off from outdoor water uses, or return waters from applied agricultural irrigation. Because of the naturally arid climatic conditions on the watershed these wastewaters have become the dominate source of water to the watershed's water bodies, both surface and groundwater.

Streams, once ephemeral, are now perennial and exceed the natural carrying capacity of the stream systems. Groundwater bodies, directly influenced by surface conditions, which historically receded during dry seasons and drought conditions, now overflow continuously. In some cases these groundwater bodies are experiencing growing surcharges that have created record high water levels, which are feared to be negatively impacting the high quality deep groundwaters of the watershed that until recently have been uninfluenced by surface conditions.

As would be expected the quality of the surface waters and shallow groundwater bodies of the watershed is poor. The quality is characteristic of wastewater. The salt concentrations are high, nutrient concentrations exceed safe drinking water standards, and concentrations of various other contaminants threaten the general health of the watershed. Fortunately, the conditions are result of relatively recent activities on the watershed and therefore may not be far beyond repair.

Regulations stemming from the Clean Water Act and Porter Cologne Act intended to safeguard the nation's and the state's surface watercourses have been the impetus for the development of a watershed planning effort on the Calleguas watershed over the past decade. A variety of studies have been completed during this effort including characterizations of the surface water quality and flows, surveys of the existing habitat and land use, and studies of sediment transport. These individual studies, while valuable in addressing parts of the watershed, have failed to recognize what makes the Calleguas Creek watershed dramatically different from the other watersheds in Ventura County and much of the Los Angeles region.

The Calleguas Creek watershed has a unique combination of low altitude urban headwaters dominated by the application of imported water with the lower reaches of the watershed dominated by irrigated agriculture. In the Calleguas Creek watershed, what at first appears to be the background hydrology and water quality is overwhelmingly an artifact of urban and agricultural development. Regulations designed to assess and regulate discrete contributions of pollution to a natural background hydrology are difficult to apply to a watershed where the natural hydrologic processes have been radically altered by the continual application of imported water.

As a simple illustration, in watersheds with natural hydrology, dry periods result in less water coming into the system. In the Calleguas Creek watershed, dry periods result in larger than average application of imported water to meet agricultural and landscape demands. As a result when a wet cycle occurs, the storage potential of the watershed is already filled with degraded imported water and fails to benefit from the natural cycle of higher quality water flushing contaminants from the watershed. The continual introduction of wastewater flows to surface waters from imported sources similarly dampens the natural hydrologic stream flow variation.

The existing regulatory framework is best applied to situations where there is a natural baseline hydrology that has not been masked by human activity. In situations like the Calleguas Creek watershed where the introduction of imported water with development has radically altered the baseline hydrology, a corresponding managed program to dispose of wastes is necessary. Resolving the water quality issues to sustain beneficial uses on this watershed will require additional modification of its already altered hydrology.

The poor quality of the surface waters and the water quality impairments identified by regulation are not the problem on the watershed, rather they are symptomatic of the far greater problem caused by the wastewater produced by the use of imported water and the lack of a management scheme to address the control and disposal of that wastewater.

Proposed Solution

The communities on the CCW depend on the on-going management of the imported water systems serving them. The continued practice of using the watershed's water bodies as conduits and sinks for the unmanaged disposal of wastewater will degrade the watershed, frustrate efforts to comply with state and national water quality policies, tax the residents' resources, and could ultimately threaten the watershed's survival.

The management of the watershed's wastewaters can be achieved through the application of several basic wastewater management principles and utilization of a few wastewater management tools. The wastewater management principles are:

1. Use imported water in the most efficient and effect manner to minimize quantity of water imported to the watershed,
2. Avoid the concentration of wastewater in the water bodies of the watershed,
3. Avoid any unnecessary salt loading or contamination of the wastewaters,
4. Capture and control wastewater wherever feasible,
5. Move concentrations of salts and other contaminates down gradient for eventual disposal,
6. Finally dispose of wastewaters, but only when no further beneficial use can be derived.

The identified tools are:

1. Source control
2. Blending and reuse
3. Groundwater management
4. Treatment
5. Brine and wastewater collection and conveyance systems
6. Ocean outfall

Given an unlimited supply of energy, imported water, and financial resources these tools can be easily used to achieve the water resource and water quality goals of the watershed. However, given that all such resources are scarce the following guidelines for utilization of the identified tools have also been developed. Some of those guidelines are:

1. Tools should not place extraordinary burdens on the State's water or energy resources,
2. Tools should not place extraordinary financial burden on the residents of the community,
3. Tools should not threaten the viability of the community's agriculture industry,
4. Tools should not threaten ecosystems or inflict irreparable damage to the natural environment,
5. Simplicity should be favored over complexity to prevent future disruption in the wastewater management system due to catastrophic events or economic downturns,
6. Site-specific water quality objectives, which cannot be achieved without extraordinary expenditures of energy, water or economic resources, should be re-evaluated and a determination made based upon the potential net benefit of the site-specific water quality standard.

The following is an outline of the proposed implementation plan for the Conejo-Lower Calleguas Creeks sub-watersheds that adheres to the principles above and, at least in concept at this point, promises to address the wastewater management issues related to salts and potentially other contaminants on the watershed. The plan is still in the conceptual stage and therefore many key elements such as institutional issues, financing, and permitting have yet to be addressed.

Outline of Proposed Implementation Plan

Plan Goals

This is a description of a phased program of projects to address water quality and water resources in the Conejo Creek and Calleguas Creek below the confluence with Conejo Creek, Ventura County, California. The program is designed to achieve the following goals:

- Meet current Basin Plan objectives for chloride and total dissolved salts,
- Eliminate all point source contaminant loading to inland surface waters from the Camarillo Sanitary District's, the Camrosa Water District's, and the City of Thousand Oak's publicly owned treatment works,
- Increase the beneficial reuse of imported water,
- Increase water supply reliability through conjunctive use,
- Reduce non-point source contamination loading to inland surface waters from poor quality rising ground waters, and
- Establish the physical pre-conditions necessary to remediate groundwater quality for increased beneficial use from the Santa Rosa Groundwater Basin and perched zone groundwater basins along the lower Conejo and Calleguas Creeks.

The phases of the program are described below and illustrated in the corresponding Figures 1 through 4. Following each program element are the agencies which may be responsible for implementing that project element.

The purpose of this description is to provide a concept-level proposal for review by the Regional Water Quality Control Board (Los Angeles) and Environmental Protection Agency (Region 9) for their determination whether it provides a basis for a more detailed plan to meet Basin Plan water quality objective for chloride.

Program Description

1. *Phase 1 – Incorporation of Camarillo Sanitary District's recycled water into distribution system.*

   A. Upgrade Camarillo Sanitary District's (Cam-San) plant to tertiary-treatment for inclusion of effluent into recycled water distribution system. (Cam-San)

   B. Connect Cam-San to existing recycled water distribution system. (Cam-San, Camrosa)

   C. Replace recycled waterline between Camrosa ponds and Camrosa Water Reclamation Facility. (Camrosa)

   D. Extend recycled water distribution system in City of Camarillo south of Highway 101 and to agricultural area south of Potrero Road. (Camrosa)

   E. Construct interim effluent outfall to Calleguas Creek south of Potrero Road. (Camrosa, Cam-San)

   F. Line Camrosa Water District water storage ponds (Camrosa)

   G. Implement public information and incentive program for Cam-San and Camrosa sewer customers to encourage use of exchange tank water softeners over self-regenerative models. (Cam-San, Camrosa)

   Projected results:

1. Reduce salt loading to impaired reaches 9B and 3 of the Calleguas Creek Surface Waters by 7.5 tons per day
2. Place 3,000 additional acre feet of recycled water to beneficial use

2. *Phase 2 – Incorporation of City of Thousand Oaks recycled water into distribution system.*

   A. Construct waterline and facilities to connect the City of Thousand Oaks Hill Canyon Wastewater Treatment Plant tertiary-treated effluent directly into recycled water distribution system. (City of Thousand Oaks, Camrosa)

   B. Introduce imported water directly into Arroyo Conejo to provide groundwater replenishment in the Santa Rosa Groundwater Basin and meet instream uses and water quality goals in Conejo Creek. (Calleguas MWD)

   C. Source Control: Implement public information and incentive program for City of Thousand Oaks sewer customers to encourage use of exchange tank water softeners over self-regenerative models. (City of Thousand Oaks)

   Projected results:

   1. Reduce salt loading to the impaired reaches 11,10, 9a, 9b, and 3
   2. Reduce total salt concentration in 10,000 acre feet per year of recycled water currently being placed to beneficial use from 850 mg/l TDS to 500 mg/l TDS
   3. Improve recharge water quality to the Santa Rosa Basin
   4. Meet surface water quality objectives for TDS and Chloride on Reaches 13, 12, 11, 10 and 9a.

3. *Phase 3 – -Begin evacuation of stranded salts from the Conejo Creek sub-watershed and reduce non-point salt loading to the Conejo Creek surface waters.*

   A. Construct brineline from ocean outfall to Camrosa Water District (Calleguas MWD)

   B. Pump poor quality groundwater from Santa Rosa Groundwater Basin for blending and reuse in the lower watershed, or disposal in brineline. (Camrosa)

   C. Source Control: Implement public information and incentive program for Santa Rosa Valley residents on septic tanks to encourage use of exchange tank water softeners over self-regenerative models. (Camrosa)

   Potential results:

   1. Export salts from the Santa Rosa groundwater basin.
   2. Reduce 5 tons per day of non-point loading to surface waters from rising poor quality groundwater
   3. Restoration of a historically valuable potable groundwater supply (2,000 – 4,500 acre feet /year) and storage resource (100,000 acre feet) in the Santa Rosa Basin.

4. *Phase 4 – -Begin evacuation of stranded salts from the lower Calleguas Creek sub-watershed and reduce non-point salt loading to the reach 3 of the Calleguas Creek surface waters from poor quality rising ground water and applied irrigation water.*

   A. Evacuate poor quality groundwater from vicinity of California State University Channel Islands and lower Calleguas Creek to control surface water discharges and create groundwater storage for higher quality recharge. (?)

   B. Source Control: Develop integrated strategies to manage agricultural salt leaching and tailwater disposal. (Ventura County Farm Bureau and other interested parties)

   Potential Benefits:

   1. Reduce salt loading to the lower Calleguas Creek and meet surface water objectives for salt and chloride in reach 3.
   2. Restoration of a historically valuable potable groundwater supply (1,500 – 3,000 acre feet /year) and storage resource (unknown capacity acre feet) in the Santa Rosa Basin.
   3. Reduce the volume of concentrated agricultural return waters entering or otherwise influencing surface waters.

Next Steps

If the Regional Water Quality Control Board (Los Angeles) and the EPA (Region 9) determine that this approach meets their interests in addressing chloride and TDS impairments, the next steps in developing this program would include:

- Responding to RWQCB and EPA comments
- Developing a list of state and federal permits that would be necessary to implement the program
- Identify and address issues that would need further analysis or refinement (e.g. the water quality model, water right issues, determination of in-stream flow quantities, local institutional relations, discharge requirements below Potrero Road, etc.).
- Initiate CEQA review.

Attachment 3:
Task Sheet for the Salts TMDL Work Plan

Attachment 4:
Schedule for the Salts TMDL Work Plan

Attachment 5:
Detailed Cost Estimate to Complete the Salts TMDL Work Plan